Busey (S.C.)

A CONTRIBUTION TO THE PATHOLOGY

OF

THE CICATRICES OF PREGNANCY

BY

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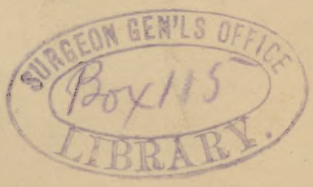

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A CONTRIBUTION TO THE PATHOLOGY OF THE CICATRICES OF PREGNANCY.

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Washington, D. C.

WHILST pursuing some recent studies in relation to the histology and diseases of the lymphatic apparatus[1] my attention was arrested by the recorded observations of the reporters of several cases of this class of diseases, which suggested to me that the prevalent opinions in regard to the histo-pathology of the cicatrices of gravidity were incorrect.

These cicatrices are usually described as red or white shining striæ, marking the skin of the abdomen, mammæ, anterior and inner surfaces of the thigh, and sometimes of the buttocks of pregnant and multiparous women, and are alleged to be due to the rupture of some one of the layers of the integument, caused by distention ; the red striæ being recent solutions of continuity, and the white those which have undergone the process of reparation by cicatrization.

Authors are not quite agreed in regard to the locality of the rupture. Caspar and Credé hold that the rete mucosum is involved ; Hecker and Schultze locate it in some layer of the cutis, or the subcutaneous connective tissue, whilst Scanzoni and Schroeder hold that the wound in some cases is in the rete Malpighii, in others more deeply seated. J. Matthews Duncan ascribes these cicatrices to the cracking of the corium, whilst the epidermis remains intact.[2]

[1] *Congenital Occlusion and Dilatation of Lymph Channels.*

[2] *Obst. J. Gr. Brit.*, London, vol. iv., p. 644.

Credé,[1] who combined the results of his clinical observations with an exhaustive analysis of the previous literature of the subject, has summarized his conclusions in the following propositions: —

1. "The striæ of the abdominal integument, in the majority of pregnant women, vary greatly in extent. They rarely appear in the first half of pregnancy, frequently only in the last half or in the last month.

2. "Soon after labor they assume a different appearance, but do not completely disappear.

3. "In not a few cases they are not formed at all during pregnancy, and occasionally, even after repeated pregnancies, no striæ are found.

4. "Sometimes they are not formed until the second or third pregnancy, and at others new striæ are added during each pregnancy.

5. "These striæ also originate in consequence of different diseases in which a rapid and considerable expansion of the integument takes place, and occur in both old and young people.

6. "The similar striæ found upon the mammæ and upon the anterior surface of the thighs, and, perhaps, also upon other parts of the body, deserve the same consideration as those upon the abdominal walls."

Schultze,[2] whilst admitting that the striæ of the abdomen of parous women may be produced by tension of the abdominal walls, insists that striæ entirely similar are caused by distention of the abdomen by other tumors, and also in the skin of other parts of the body by considerable swelling of the formations enclosed by it, that is, in great edemata, in rapid development of the panniculus, in great increase of the volume of the mammæ, and upon the integument of the thighs of adult males by the growth of the skeleton. He invites special attention to the fact that these scar-like spots are developed at irregular periods of the child-bearing

[1] *Monatschr. f. Geburtsk. u. Frauenkr.*, Berlin, Bd. xiv., p. 319, 1859.

[2] *Jenaische Ztschr. f. Med. u. Naturw.*, Bd. iv., 1868.

life of women; in some they are very sparse, in others very numerous, and in many primiparous cases with very great distention of the abdomen none are to be found, whilst in other instances the entire abdomen, and sometimes the back, is covered without the conditions leading to these differences being discoverable.

In support of the proposition that the striæ, especially upon the thigh, must in a number of cases be "due to causes differing from those leading to abdominal striation during pregnancy," he examined two hundred and twenty-two females between the ages of fifteen and thirty-five, "all of whom possessed a tense, smooth abdominal integument perfectly free from striæ, and who had never been pregnant." Of these, thirty-six per cent. presented cicatrices upon the anterior surfaces of their thighs, which he could not connect in any causal relationship with age, obesity, duration of menstruation, or any other condition or process peculiar to women. He also found striæ, similar in every respect, upon the thighs of six per cent. of adult males in the prime of life, but they were less numerous and showed a less constant direction; in strikingly tall men being usually transverse, whilst in females, almost without exception, the direction was longitudinal.

As a rule, in those cases where the development of the striæ could be traced to distention of the integument from rapid growth of the formation surrounded by it, as in pregnancy, this "direction was perpendicular to that in which the distention was most pronounced." Applying this general law to the explanation of the differing direction of the striæ found upon the thighs of males and females, Schultze concludes that the remarkable growth in width in this region, mainly dependent in females on increase of the panniculus, bears a causal relation to the development of the longitudinal striæ, and that the transverse striæ, which are most frequently present in very tall males, are in connection with the growth of the skeleton. So that in those adult males, by far the most numerous class, upon whose thighs striæ were seen in both directions, the origin of the

transverse was ascribed to the growth of the skeleton, and of the longitudinal to the development of the panniculus.

Hecker's [1] examination of the condition of the abdominal integument of child-bearing women led him to conclusions somewhat different, in regard to the development and causes of the striæ. He corroborates the well known fact that the abdominal walls vary in different women during pregnancy in thickness, resistance, and tension, but denies that these conditions necessarily decrease in proportion to the number of pregnancies, and claims that the separations in the subcutaneous tissue, "known as the striæ gravidarum," present no uniform connection with existing or previous distention, or amount of fat supply, but are always absent when the elasticity of the deeper layers of the integument is sufficient to prevent the mechanical separation of the fibres. He asserts, furthermore, that independent of the differing condition of the abdominal walls, and of the integument in general, "it would be impossible to explain why they sometimes appear perfectly intact in great distention, while in moderate dilatation the striæ are not only exceedingly numerous upon the abdominal integument, but also extend to the integument of the thigh, the nates, and back; exactly as the same difference, not depending upon degree of tension, is seen with reference to striæ upon the mammæ."

Credé found no trace of striæ in ten per cent. of the pregnant women examined by him. Hecker in four hundred and ninety-four pregnant females failed to discover them in six and six tenths per cent., but the analysis of these cases according to the number of pregnancies seems to warrant the deduction that the proportion of those exhibiting no trace of these lacerations diminishes with the frequency of pregnancy. This observation, together with the denial, previously referred to, that distention of the abdominal walls bears any constant relation to the development of striæ, leads, presumably, to the conclusion that the recurring and changed conditions of pressure, such as may

[1] *Klinik d. Geburtskunde*, I, 1861, p. 13, *et seq.*

occur from subsequent pregnancies, a larger fetus, or a greater amount of liquor amnii, diminish the elasticity of abdominal parietes.

The investigations of Credé, Schultze, and Hecker, which I have attempted to epitomize, are limited to the study of the history and clinical phenomena of the striæ of gravidity and their concurrent development upon other parts of the body, with special reference to their value as a sign of a first or recurring pregnancy. Incidentally they have examined them in connection with other circumstances and conditions causing distention of the integument of the abdomen, and of other parts of the body of both sexes, but neither has attempted to investigate the anatomy of these cicatrices.

Küstner[1] denies that the ruptures upon which they are believed to depend, occur in the rete Malpighii and points out the fact that the passage of a finger transversely across a stria discloses a furrow or solution of continuity of some layer of the integument, feeling like a sulcus covered by a more or less thin layer, which, upon being raised by the forceps is evidently much thicker than the corneal layer, of which it would only consist if the fissure occurred in the rete Malpighii.

He points out, furthermore, that a microscopic transverse section, cut in such a manner as to include a portion of the epidermis covering a stria and a portion covering intact tissue, taken from a living primipara, will exhibit (as shown in Fig. 1.), the Malpighian layer as completely preserved above the stria as above the intact part of the integument, but the direction of the rete and corneal layer in the part corresponding with the stria is straighter than in the other portion, and is without the elevations and depressions usually marking the healthy integumental surface. It will be observed also that the under surface of the rete is free from the irregularities caused by the papillary layer,[2] perhaps

[1] *Arch. f. path. Anat.*, etc., Berlin, 1876, Bd. lxvii., p. 210.

[2] This may be due to the manner of securing the specimen from a living subject, but the intact portion (right) exhibits, in a modified manner, these irregularities.

because of the partial or complete obliteration of the papillæ.

In this manner Küstner claims to have repeatedly demonstrated that the rete mucosum was undisturbed, but that the deeper layers of the cutis and the subcutaneous tissue are separated from each other.

The color of the striæ is variously described by different observers. Credé says the color, in primigravidæ, is "usually shining, reddish or brownish, but is essentially modified by the pigment formations of the body of the woman,

FIG. 1. — Microscopic Section of a Stria and portion of adjoining Intact Epidermis taken from a living Primipara. Left portion corresponding with the Stria; right with the Intact Tissue. — *Küstner*.

thus, in the blondes and red-haired the coloration is bright or rose-red, in dark or brown-haired they are brownish, in others they are pale and dirty looking." Montgomery describes them as sometimes "glistening and white, at others colored." Krause says they are "silvery, becoming paler and narrower after confinement." Cazeaux describes them as "brown or bluish, paling after delivery;" Baudelocque "as white and light spots;" and Osiander as colored, "reddish, brownish, or bluish, leaving after delivery the integument in a pale-brownish, rugous condition." Kaposi ascribes the red color of striæ to hemorrhage and the varying shades and modifications to the gradual and continuous absorption of the effused blood.

Küstner attributes the color of the recent striæ to the transparency of the epidermis, caused by stretching, and effacement of the surface furrows which permits the deeper

tissues to be seen. He claims to have shown this by experimental demonstration on the cadaver, by cutting subcutaneously or subepidermically and stretching "the skin at right angles with the incision, when the section will exhibit a color like striæ." The glistening, which Küstner denies is a characteristic of older striæ, is ascribed to the diminished transparency and dryness of the separated portion, but more frequently to the direction at which it is viewed, appearing colored when seen in a perpendicular line, and whitish and glistening when seen in the direction of the illuminating rays.

"After labor, when the distention of the abdomen has suddenly (Küstner) ceased, the tensely stretched portion of the epidermis covering the striæ, like the intact parts of the integument, falls into folds, and the skin furrows which had been obliterated are again to be seen corresponding with the direction of the lines on the intact integument, but the folds of the striæ during the earlier days of puerperal convalescence are coarser and assume the form of vesicles. This vesicular formation, Küstner says, "is the first beginning towards transverse striation, by which from time immemorial old and new striæ have been differentiated."

"It may be easily conceived," continues Küstner, "that such vesicles, especially during disturbances of the circulation, afford a very opportune locality for hydropic transudation."

Hecker concludes his discussion of the appearances of the abdominal integument of childbearing women with the following significant statement: —

"A peculiar alteration of the striæ, which I have not rarely met with, consists in this, that they do not, as is usual, lie upon or beneath the level of the integument, but rise beyond and appear dropsical and swelled. This phenomenon is only seen in the hypogastric region and in cases where, through some condition, especially a pendulous abdomen, an unusual pressure is exercised upon the epigastric vein, leading to dropsical swelling of the abdominal

integument in the region referred to. Such serous infiltration as a rule does not strike us at once, but makes itself known when upon auscultation the impression of the stethoscope remains for some time as if in a doughy mass; if, then, we examine the spot more minutely we find in the artificial interspace marked by the striæ in the subcutaneous connective tissue serous effusion, also, which has forced out the super-imposed epidermis and thus causes the striæ to appear prominent."

These observations of Küstner and Hecker suggest the probable formation of a space or cavity under the covering epidermis in which serum or, perhaps, lymph collects, not unlike similar white, opaque, glistening, scar-like spots which have been observed in a few cases of disease of the lymphatic apparatus. These analogous appearances occurred as follows: —

The case of congenital lymphangiectasis[1] reported by Thilesen is one of the most instructive. A boy, aged nineteen, had from infancy a perfectly smooth, painless tumor of the skin, sharply defined above by Poupart's ligament and extending downwards towards the knee. After a time, especially upon the anterior and inner aspect of the thigh, towards the scrotum, — a region rich in lymphatic net-works and anastomoses, — the skin thinned in places, presenting small, shining, slightly-elevated spots, looking like cicatrices. These spots, when ruptured, either spontaneously or by violence, discharged a yellowish-white, opalescent, coagulable fluid, which sometimes escaped in jets. Subsequently the enlargement increased and extended downwards, involving the leg and foot and many of the former thinned, shining spots developed into transparent vesicles, distended with fluid, which on microscopic examination exhibited the usual characteristics of lymph. Similar thin-skinned spots formed upon the foot, especially upon the plantar surface and between the toes, and numerous vesicular projections formed upon other parts of the limb, especially upon the

[1] Case LII., Busey, *Congenital Occlusion and Dilatation of Lymph Channels*, pp. 64, 90.

inner surface of the thigh, varying in size, the largest not exceeding one and a half lines in height, and looking like shining spots in the hypertrophied integument. The lymphatic varices, either in the form of shining spots or distinct and elevated vesicles, were only found in regions where finely meshed lymphatic net-works are distributed through the integument, and on the plantar surface and sides of the toes (Thilesen), where the richest lymph net-works of the lower extremity are found, and were traced in communication with lymphatic vessels.

In the case of Rosina Geng,[1] reported by Carl W. Hecker, the congenital tumor extending downwards from the neck to, and involving, the buttocks, which contained numerous caverns, formed by the greatly expanded connective tissue interstices, filled with a fluid rich in albumen and salts, was covered with skin "traversed by white lines and excavated spots, like the abdomen of women who have borne children."

Professor Kussmaul[2] reports the case of an old woman, who "suffered from cirrhosis of the liver and ascites. From the middle region of the abdomen a multitude of cord-like vessels of the thickness of quills, which looked like rows of pearls, were much twisted and prominent, proceeded downward toward both inguinal regions; in their course they gradually flowed into one another, and ended in a few large vessels of the thickness of the little finger, which disappeared in the inguinal region. These vessels commenced on the middle and upper part of the abdomen in spots of different size, which were transparent and not prominent. They were probably vessels flattened by great tension, and might have been easily confounded with the cicatrices of pregnancy."

"On puncturing these vessels a yellow, opaque, neutral fluid escaped, which contained albumen and showed an acid reaction."

Hanfield Jones[3] has reported three cases of "dilatation

[1] Case LXXXII. Busey, *loc. cit.*, p. 121.

[2] *Med. Times and Gaz.*, vol. ii., p. 119, 1861.

[3] *Lancet*, London, vol. ii., p. 159, 1875.

of the lymphatic radicles," which presented a plexiform arrangement of freely intercommunicating "vasoid spaces," lying immediately beneath the epidermis, seeming to groove the corium, and disappearing at the localities where the superficial vessels passed into the tissues to unite with the deeper lymphatic vessels. The intercommunication of these sub-epidermal vasoid spaces and the direction of the current of lymph was demonstrated by the rapidity and continuousness of the discharge from a needle puncture. No vesicle formations were present. The excessive transudation of fluid found efflux through the dilated spaces, communicating one with another along a continuous course, and finally emptying into the deeper system of vessels.

I might introduce other illustrations, but as the object is simply to connect the development of similar white, scar-like spots and streaks with recognized disturbances of the lymphatic apparatus, I will conclude these citations with a case which came under my own observation. It was an instance of congenital enlargement[1] of the left lower extremity, upon the skin of which was a group of vesicles and a number of cicatricial-looking spots, as shown in Fig. 2.

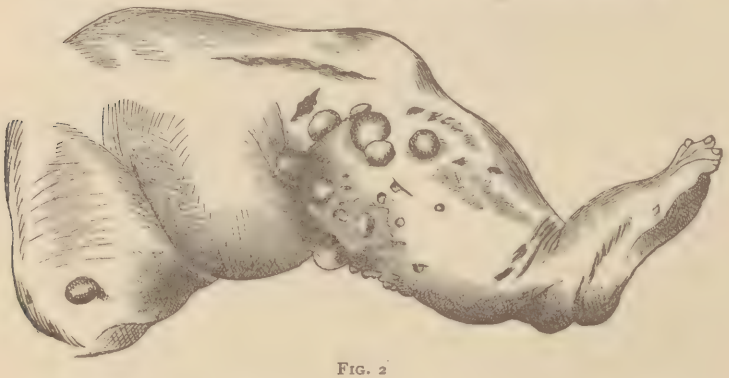

FIG. 2

After the death of the child quicksilver was injected into the lymph vessels of the limb, filling the vesicles and developing the scar-like spots into pouches elevated above

[1] *Congenital Occlusion and Dilatation of Lymph Channels*, p. 8.

the level of the surrounding surface. There was no difference in the appearance of the integument covering the injected vesicles and cicatricial-looking spots. From one of the pouch-like elevations the skin was snipped off, and through the base of the previous vesicle or space were seen two very minute openings through which the liquid contents of the vesicle and mercury had entered the cavity underlying the skin. A vertical microscopic section of the covering integument (as shown in Fig. 3) exhibited the

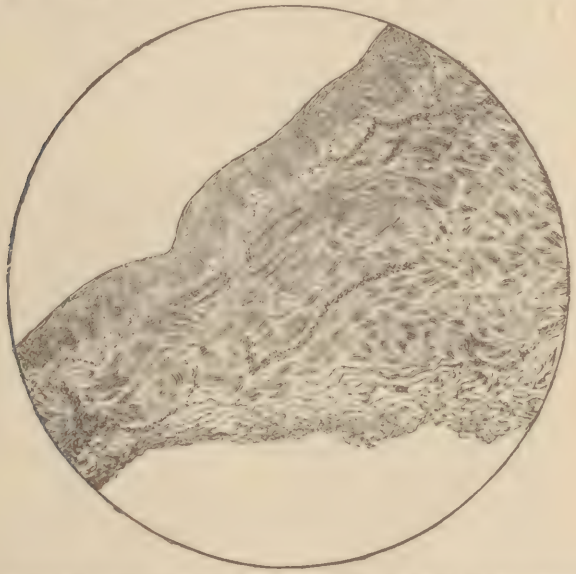

FIG. 3.—Section of Integument covering one of the Vesicles on the Leg of the Child as seen in Fig. 2. From a Drawing by Dr. McConnell.

skin entire in all its constituent layers, but thinned and partially atrophied. The vesicles were simply pouches of skin containing lymph, their upper walls consisting of nothing but the components of the skin, with here and there newly formed connective tissue encroaching upon the cavity. The enlargement of the limb was due to an extraordinary development of the panniculus adiposus, which assumed a lobulated arrangement. The integument covering the lobes as of the entire limb, excepting the portions in-

volved in the vesicular and scar-like formations, appeared normal, but could not be pinched up, was less movable than the skin on healthy parts, did not pit on pressure, but was not dense, smooth, shining, and parchment-like as usual in scleromatous conditions.

In this, as in cases of Thilesen, Hecker, and Hanfield Jones, there was no doubt in regard to the disturbance of the lymph circulation, or of the character of the liquid contents of the cystic formations. In this instance the skin forming the pouch-like elevations was detached from the subcutaneous tissue, and the cavity or space containing the fluid was beneath the corium. This, however, is not a constant mode of formation of lymphatic vesicular developments. In a case of lymphorrhea and lymphorrhagic pachydermia,[1] observed by Odenius, the multitude of minute roundish or irregularly formed vesicles, which thickly studded the inner surface of the thigh, were either excavations in the more or less thick Malpighian layer extending downwards in a funnel-shaped form, with apex lowermost, into the papillæ, or were more or less capacious vertical caverns, located in the epidermis extending to and touching the papillæ. In either case the vesicle-formations[2] originated in the dilatation of preformed lymph vessels or spontaneously-formed lacunæ of the papillæ into which the fluid escaped from the superficial lymph net-work of the cutis.

The lymphatics of the skin (Biesiadecki)[3] consist of vessels and spaces, the latter being the tissue interstices which in edematous conditions are "for the most part the seat of the effusion." The vessels proper are arranged into two freely anastamosing net-works, the outer lies beneath the external and the inner below the deeper blood vascular plexus. The connection of the serous interstices or lymph spaces of the corium with the vessels proper has not been demonstrated. Neumann claims that the lymph capillary system of the skin are closed canals without stomata, unconnected with

[1] *Deutsche Klinik*, 1874, p. 385.
[2] Odenius.
[3] *Stricker's Manual*, p. 542.

the spaces, whilst Recklinghausen traces the origin of the capillaries to the open interstices. Biesiadecki denies that the papillæ in a normal condition are supplied with lymph vessels. Teichmann, however, holds the opposite view, but admits that the central lymph vessels of the papillæ in the normal skin never extend entirely to the apex, sometimes only forming small, pouch-like projections into their bases, and in others extending farther up ; but that every papilla is not supplied with a central lymph vessel. When found they are derived from the sub-papillary net-work. In the skin of an elephantiatic leg Teichmann found, with few exceptions, the papillæ provided with lymph vessels, usually at their bases, dividing into branches, which emptied into the superficial net-work, as shown in Fig. 4.

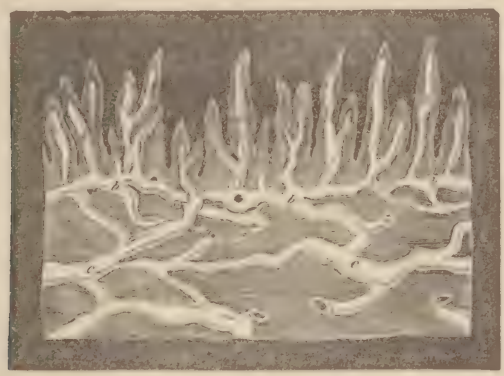

FIG. 4. — Perpendicular Section through Integument of Sole of Foot affected with Elephantiasis; *aa*, the Cul de Sac Starting-points of Lymph Vessels in enlarged Papillæ; *b*, Vessels of External Layer; *c*, Vessels of Internal Layer. From Teichmann.[1]

These observations of Teichmann and Odenius, so contradictory to the generally accepted opinion that the papillæ are wanting in lymph vessels, suggest the inquiry whether the central lymph vessel of a papilla, when found, is a newly formed or a pre-formed vessel. Odenius found, for the most part, that the papillæ which did not participate in vesicle formations were "small and without any sign of a cavity," but in isolated cases he recognized tracks or

[1] *Das Saugadersystem*, p. 62, Leipzig, 1861.

sinuses extending from the superficial net-work more or less into the bases of the papillæ, which were excavations in the tissue of the corium.

In view of these histological and pathological demonstrations of the lymph channel system of the skin, and of the modes of formation of lymphatic vesicles on the integumental surface, the presumption is strongly justified that the statement of Schultze, that striæ are occasionally developed into vesicles in edematous conditions of the abdominal integument; the serous infiltration of striæ not infrequently observed by Hecker, and the vesiculation which Küstner asserts is the ordinary condition of the striæ during the earlier days of puerperal convalescence, are due to disturbances of the circulation in this system of vascular channels and tissue interstices. They agree in locating the lesions, marked on the surface by striæ or scar-like spots, in the deeper layers of the cutis, or in the sub-integumental connective tissue; the latter claiming to have lifted with the forceps the separated white and glistening patch or streak from the underlying structure. In one instance the dilated serous interstices of the corium would contain the effused fluid; in the latter the vesicle would underlie the derma. The essential fact made evident by these corroborating observations is, that scar-like striæ or spots, believed to be developed in connection with pregnancy, may mark the localities of fluid accumulations in the expanded lymph spaces of the cutis, and of cavities filled or collapsed beneath the corium.

Küstner's investigations refer only to the condition of the epidermic layers, and his conclusion that the injury consists in a separation of the cutis vera from the subcutaneous connective tissue is simply a hypothesis. To more definitely determine the nature of the injury, if any, of the skin, I have had prepared microscopic sections of the integument covering a stria, and of the normal integument, from the abdomen of a woman who had borne children.[1]

[1] Only one who has made a similar attempt can appreciate the difficulties which attend such an investigation. The opportunities of securing sections are so rare, that I might with Küstner lament the salu-

Figure 5 represents a perpendicular section of the normal integument of the abdomen in which all of the constituents present the characters usual to the skin of that region.

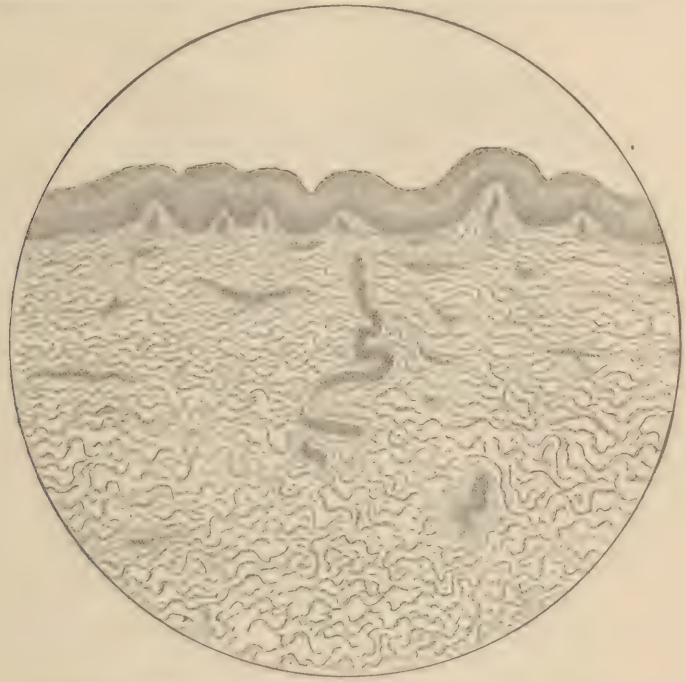

FIG. 5. — Normal Integument of the Abdomen of a Child-bearing Woman

The papillæ are rather large, irregularly situated, and comparatively few in number.

tary effects of the antiseptic methods of treatment now employed in the lying-in-hospitals, which present so few cadavers of lying-in-women. The cuts (Figs. 5 and 6) are from drawings, by Dr. McConnell, of sections prepared for me by Prof. James Tyson, of Philadelphia, whose courtesy and politeness I desire to acknowledge in the fullest manner.

I submit these investigations to the profession, though incomplete, hoping some other who may have superior advantages will extend them, at least, so far as to compare sections of old and new striæ found on the abdomen of child-bearing women, with sections of similar scar-like appearances occurring on other parts of the body of child-bearing women, and of other persons, male and female, who may exhibit the diseased conditions with which striæ are usually observed.

The connective tissue bands of the corium have an unconstrained, easy interlacement, in which they differ from the appearance in Fig. 6, as shown below.

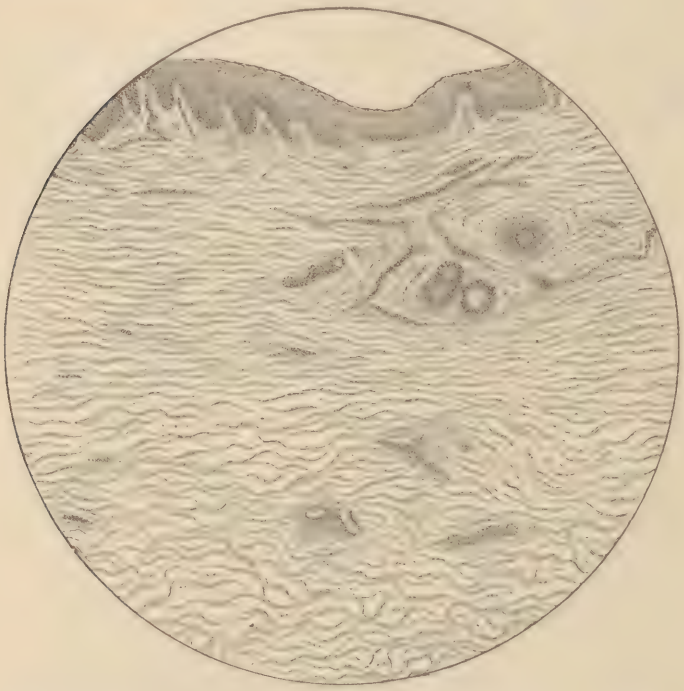

FIG. 6. — Section of a Linea Albicans from the Abdominal Integument of a Woman

Figure 6 is an oblique section of a stria ; in general characters the elements resemble those shown in Fig. 5, with the exception of the papillæ, which are not quite so prominent, but relatively more numerous.

The most marked difference between the two specimens is in the appearance of the bands of the corium. In Fig. 5 they interlace in all directions with large irregular interspaces, while in Fig. 6 they seem, especially in the middle portion, to run horizontally parallel, giving them a drawn, laminated appearance, with straight compressed interspaces. The sweat glands are also drawn, so that their

ducts in some instances run quite parallel with the papillary layer.

The whole appears to have been so compressed and drawn as to materially reduce the thickness of the skin, but in other respects the constituents have been left intact.[1]

The important inquiry now presents itself: "What do these clinical observations and microscopic demonstrations prove?"

It must be evident that these striæ and white scar-like spots are not, in the pathological acceptation of the word, cicatrices. The presence of the skin furrows, and respective layers of the integument, though in a condition of partial atrophy, together with the usual integumental appendages, excludes such an interpretation of the appearances.

Do the striæ represent any process or stage of vesiculation? In the simplest form of vesicles, as seen in sudamina, the fluid (Tilbury Fox) is seated between the strata of the horny layer of the cuticle; in another form, as in pemphigus, it is located between the horny and Malpighian layer; in the more complex forms, characterized by inflammatory processes, the loculi are formed of the dilated cells of the rete-mucosum. All these forms are excluded by the absence of any appearance in either the horny or mucous layer, as represented in Figs. 1 and 6, which bears any analogy to such vesicular formations. Lymphatic vesicles exhibit very different methods of development. Most frequently they are formed by vacuolation of the papillæ as shown in Fig. 4; less often by excavation in the mucosum and obliteration of the papillæ, as in the case of Odenius. This latter mode was, perhaps, a modified form of vacuolation, as through the funnel-shaped bases of the vesicle, which occupied the localities of the papillæ, minute openings could be seen (Odenius) communicating with the superficial lymph plexus. Not infrequently they are simply the dilated interstices of the corium, or expanded

[1] These anatomical descriptions were prepared for me by Dr. McConnell, from the sections prepared by Dr. Tyson.

chambers of the subcutaneous cellular tissue. In a fifth form the cavity or space underlies the papillary layer.[1]

These lymph varices differ in mode of development from the ordinary cutaneous and exanthematous vesicles, but only in the forms consisting in expansion of the interspaces of the corium or of the chambers of the subcutaneous connective tissue, do they exhibit any appearance analogous to the striæ of pregnancy. The swelling, elevation, and hydropic condition of the striæ of gravidity in edemata, ascites, diseases of the liver and spleen, and in cases of circulatory disturbances, either of a general or local character, point to effusion into the serous spaces as a consecutive phenomenon, due to extraneous causes and conditions, independent of the structural changes occurring in the striæ, except so far as these changes may favor the accumulation of fluid in loculi in circumscribed portions of the integument. It seems, then, that the striæ of pregnancy, in themselves, are not any form or stage of vesicle formations.

It is nevertheless true that variously-shaped, silvery-white, glistening marks found upon the integument of the abdomen and other parts of the body of both sexes, and in connection with a variety of morbid conditions, present the objective appearances of the striæ of pregnancy, but differ from the latter in the histo-pathological alterations of the integumental tissues.

What then are these structural alterations? Kaposi[2] describes several varieties of atrophic striæ and scar-like spots; the idiopathic form consists of white streaks or round and oval spots, depressed below the surface of the sound skin, glistening and smooth, varying in size from that of a lentil to that of a half crown, occasionally found on the skin of women who have passed the age of puberty, but never been pregnant. In this form the epidermic layers are most atrophic, and the papillæ have disappeared. The symptomatic variety consists of similar stripes, streaks, and spots,

[1] Rindfleisch, *Text Book of Pathological Histology*, Amer. ed., pp. 312, 313.

[2] Hebra, *Diseases of the Skin*, vol. iii., pp. 261, 264.

ascribed by Kaposi to "straining, stretching, and partial rupture of the deeper layers of the corium" and subcutaneous tissue, caused by distention from pregnancy, ovarian cysts, ascites, and neoplastic growth in the abdominal cavity, and on other parts by tumors of various kinds. In this form the atrophy is mainly confined to the deeper layers of the corium. A third variety is due to degenerative processes involving the cell elements, but does not relate to this discussion.

Kaposi bases his distinction between the two forms upon the atrophy of the epidermic and absence of the papillary layers in the idiopathic, and atrophy of the deeper layers of the corium in the symptomatic, form. In both varieties the fatty layers are similarly atrophic. In the absence of opportunity to compare the appearances exhibited in Figs. 1 and 6 with sections of striæ of the idiopathic variety the anatomical differences described by Kaposi cannot be disputed, but the limitation of the atrophy to the reticular layer of the corium, in the striæ of pregnancy, falls far short of the fact. I find all the constituent layers in a condition of partial atrophy, sufficiently advanced to account for the depression of the surface below the level of the normal integument. In addition there is condensation of the connective tissue net-work, with compression and partial obliteration of the serous or lymph spaces. It must follow, then, that the striæ of pregnancy do not represent rupture of the Malpighian layer, nor any laceration or separation of the connective tissue fibres or layers of the cutis vera.

Kaposi, however, draws a sharper line of distinction in the clinical aspects of the two forms; in associating the symptomatic form always with distention of the integument, and ascribing the idiopathic to some undetermined cause, present only in women who have passed the age of puberty, but never been pregnant, and in men. He would thus formulate the statistical researches of Schultze, and classify under the idiopathic form the striæ found upon the thighs in 36 per cent. of women between the ages of fifteen and thirty-five, who had never been pregnant, and

in 6 per cent. of adult men. But this classification must fall in view of the failure of Credé to discover striæ on the abdomen of 10 per cent. ($7\frac{1}{2}$ per cent. multiparæ and $2\frac{1}{2}$ per cent. primiparæ) of child-bearing women, and of Hecker in 5 per cent. of multiparæ and 11 per cent. of primiparæ, where the conditions precedent to distention were present.

In this connection the following facts must be considered: the "perfectly intact condition (Schultze and Hecker) of the abdominal integument in some cases of great distention, while in occasional instances of moderate dilatation the striæ are not only exceedingly numerous on the abdominal integument, but also extend to the integument of the thigh, the nates, and back;" their sparseness in some pregnant females (Schultze) and profuseness in others without the conditions leading to these differences being discoverable in several cases; their absence in some pregnant women from the abdomen, but appearance upon the thighs and other parts of the body; the want of any connection between the development of (Hecker) striæ and the quality of the abdominal parietes, as illustrated in their absence in very many cases of (Denman) extraordinary obesity in virgins, and their presence in virgins with (Osiander) flaccid and rugous abdomens and pendulous mammæ; their non-appearance in subsequent pregnancies in a large proportion of those who have normally (Credé and Montgomery) completed their first pregnancy without the formation of striæ; and their absence in some women whose skin is as smooth and tense after birth as it was during their virginity. If, then, the striæ of gravidity are to be classed in the symptomatic form distention cannot be the only factor of causation, perhaps not at all, independent of the presence of some condition of the integument, as yet unknown, which favors the development of these localized atrophies; or, what seems more probable, the special condition or peculiarity of organization attaches to the exceptional class of pregnant women, and expresses itself in resistance to the causative agencies and influences which dominate the organism during utero-gestation.

NOTE. Since this essay was read before the Society the journal [1] which contains the paper by Professor Langer, entitled "Cicatrices of Gravidity," has reached me.

Professor Langer says, "the fibre bundles of the connective tissue of the cutis are arranged in such a manner that they cross one another, forming rhomboid meshes, the longitudinal axis of which is placed upon the trunk, corresponding somewhat to the direction of the ribs, from the spinal column forwards and backwards. The cutis tissue, therefore, may be the more easily expanded in a direction perpendicular to the long axis of these rhombs, than in the contrary direction.

"In a slight dilatation of the abdomen the distention will occur in this direction, but this is very soon obliterated; it is different, however, when the distention is very considerable, when the elasticity of the tissue is thereby destroyed; in the latter case the cutis tissue will obtain a permanently different arrangement."

He claims to have demonstrated by "flat sections through the skin at the locations of such cicatrices," that on both sides "the cutis tissue presents the normal meshes, yet the fibre bundles pass nearly parallel and transversely through the cicatrix. In cross sections this condition is shown to extend through the entire thickness of the cutis; the cicatrix showing itself even to the naked eye by its silky sheen — a consequence of the parallel course of its fibres."

From these observations Professor Langer concludes there is "no solution of continuity," but "only a permanent disarrangement of the tissue produced by stretching."

He insists, also, that "the papillæ of the abdominal integument are arranged in approximately rhomboid, and sometimes triangular or similar, formations," and in cases of distention they are subjected to a corresponding disarrangement. "In small cicatrices the papillæ are found in transverse rows, but in larger ones they are very much rarefied," few being arranged in rows, and extending but little

[1] *Medizinische Jahrbücher*, Wien, Heft ii., p. 141, 1879.

beyond the surface, "frequently confluent like saw-teeth." Thus some papillæ and their corresponding capillary loops are by stretching obliterated.

His final conclusion is that not "only the cutis tissue itself, but also the papillæ and vessels are arranged corresponding to the distention," and therefore the so-called cicatrix "is a rearrangement of the tissue, which rearrangement has become permanent, because the elasticity of the tissue has been destroyed."

Professor Langer's explanation of the method of production of these scar-like striæ by obliteration of the rhomboid spaces of the connective tissue of the corium, and also of the papillæ, commends itself for simplicity and ingenuity. That the "rhomboid meshes," otherwise known as the serous or lymph spaces of the corium, are[1] wholly or partially obliterated, I have shown. It is probably also true, as first suggested by Hecker, that the destruction of the elasticity of the cutis tissue by long continuance and considerable distention produces a "permanently different arrangement" of the connective tissue bands, which I have described as running horizontally parallel (see Fig. 6), giving them a drawn laminated appearance, with straight compressed interspaces. The distention would likewise necessarily involve the papillary layer, and it is not improbable that the atrophic condition as shown in Fig. 6, is in part the result of partial obliteration by the stretching out of the looped arrangement of the fibrillæ in the papillæ, giving them, as so aptly described by Langer, a "confluent like saw-teeth" arrangement, not unlike the appearance as seen in Fig. 6.

[1] See p. 16.